

## 9.002

**Epidemiology of Multiple-Resistant Gram-Negative Bacteria in Europe and North America**

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**Background:** Recent reports of multidrug resistant (MDR) gram-negative rods (GNR) are concerning; however, it is not clear how extensive this problem is nationally. The National Healthcare Safety Network (NHSN) collects information on select hospital-associated infections (HAI) from about 600 hospitals throughout the U.S. and is a system that may be used to evaluate this problem.

**Objectives:** To describe the prevalence of MDR among *K. pneumoniae*, *P. aeruginosa* or *A. baumannii* HAIs reported to NHSN.

**Methods:** HAIs due to the aforementioned pathogens reported to the NHSN device or procedure modules from January 1, 2006 to September 15, 2007 were evaluated. Isolates were included if they had susceptibility results for at least 1 agent in each of 4 classes of antimicrobials: aminoglycosides, quinolones, beta-lactams (penicillins and cephalosporins), and carbapenems. Isolates were classified as MDR if reported as resistant or intermediate to all drugs tested in all 4 classes. Other potentially important resistance phenotypes were also evaluated. Pooled mean (%) MDR were determined by pathogen and HAI type. To better characterize the national prevalence, results were stratified to control for facilities that reported large numbers of MDR-GNR (outlier facilities).

**Results:** Overall, 313 hospitals in 42 states reported 4,790 hospital-associated infections with selected GNR: 2,432 *P. aeruginosa* (bloodstream infection [BSI] 327, ventilator associated pneumonia [VAP] 889, urinary tract infection [UTI] 866, surgical site infection [SSI] 350); 1,740 *K. pneumoniae* (BSI 490, VAP 417, UTI 650, SSI 183); and 791 *A. baumannii* (BSI 221, VAP 439, UTI 92, SSI 39). Among *P. aeruginosa*, 3% of isolates were MDR and 6% were non-susceptible (NS) to both quinolones and aminoglycosides, agents often added to beta-lactams to treat *Pseudomonas*. Among *K. pneumoniae*, 8% of isolates were MDR and 10% were NS to carbapenems. Among *A. baumannii*, 26% were MDR. MDR isolates were reported from 68 (30%) facilities in 21 states and were more commonly reported from larger hospitals (>500 beds,  $p < 0.001$ ). The percent isolates that were MDR varied slightly by type of HAI (table). Pooled mean (%) MDR varied when states with outlier facilities were excluded (table).

**Conclusions:** As defined, MDR among GNR is not rare in US hospitals reporting data to NHSN. MDR-GNR were not confined to one geographic region and are more common, but not limited to, larger hospitals. The paucity of novel antimicrobial agents in development to treat these organisms places increasing emphasis on infection control efforts.

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**Burden and Future Gram-Negative Resistance in Asia/Australia**

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Resistance of Gram negative bacilli to commonly used antibiotics is commonplace in the Asia-Pacific region. In general, rates of resistance are highest in India and some parts of China and lowest in Australia and New Zealand. Extended-spectrum beta-lactamase (ESBL) producing *Klebsiella pneumoniae* and *Enterobacter cloacae* are significant nosocomial pathogens in the region. Rates of ESBL production in some species is as high as 80% in some institutions. Community-onset ESBL producing *Escherichia coli* is becoming evident in certain geographic regions such as Thailand, India and some parts of Australia. CTX-M-15 has been described in this scenario in India. There are reports of KPC-producing organisms in China, but thus far this resistance mechanism has not been described elsewhere in Asia/Pacific. Metallo-beta-lactamase producing *Pseudomonas aeruginosa*, *Acinetobacter baumannii* and *Enterobacteriaceae* are well described in the Asia-Pacific region. Carbapenem resistant *A. baumannii* is a particularly problematic pathogen in some ICUs. Significant issues with regards to the high prevalence of antibiotic resistant Gram negative bacteria in the region include over the counter availability of antibiotics in some countries, agricultural use of antibiotics and suboptimal infection control. Attention to these issues is essential to forestall the onset and spread of polymyxin resistance in the region.

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## 9.004

**How to Prevent the Spread of Multiple-Resistant Gram-Negative Bacteria in the Hospital Setting**

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Infections caused by multi-resistant Gram-negative bacteria are thought to cause increased morbidity, longer length of hospital stay, and higher treatment costs when compared to infections caused by susceptible strains. Successful control of healthcare-associated, multi-resistant Gram-negative bacteria is relying on several complementary control strategies. Clearly, there is no level of antibiotic resistance where control measures are not warranted any more. First, early detection of resistance carriage may allow rapid contact isolation of identified carriers and improve the adequacy of antibiotic prophylaxis and treatment, especially in critically ill patients. Several recent outbreak reports have shown the importance of surveillance and screening cultures in order to prevent transmission and infection by multi-resistant Gram-negative bacteria in the critical care setting. Although the most efficient screening strategy depends on the local situation and type of resistance and is therefore still a matter of debate, most affected acute care hospitals should install a screening policy for patient groups at high risk of carriage